

Serial No. 09/554,708

Amendments to the Claims:

Claims 17-23, 27, and 28 have been amended herein. Please note that all claims currently pending and under consideration in the referenced application are shown below. Please enter these claims as amended. This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

Claims 1-15 (Canceled)

16. (Previously Amended) A process for producing alkyl esters useful in biofuels and lubricants, said process comprising:

providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids;

providing a critical fluid medium including one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and mixtures thereof;

dissolving the organic composition and either a C₁-C₄ short chain alcohol or water into the critical fluid medium;

reacting the organic composition with the short chain alcohol or water in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol, wherein said glycerol leaves the single phase as it is formed;

separating the glycerol from the alkyl ester; and

separating the alkyl ester from the critical fluid medium,

wherein the particular critical fluid medium is selected so that, when combined with the organic composition, the critical fluid medium provides decreased loss of catalyst or catalytic activity and elimination of mass transfer limitations by maintaining the various reactants in a single phase.

Serial No. 09/554,708

17. (Currently amended) The process of claim 16, wherein ~~dissolving the organic composition and either a C₁-C₄ short chain alcohol or water into the critical fluid medium comprises dissolving the organic composition and said short chain alcohol is selected from the group consisting of ethanol, methanol, propanol, butanol, isopropanol and isobutanol into the critical fluid medium.~~

18. (Currently amended) The process of claim 16, wherein ~~reacting the organic composition with the short chain alcohol or water in the presence of a catalyst comprises reacting the organic composition in the presence of said catalyst is a liquid phase catalyst.~~

19. (Currently amended) The process of claim 18, wherein ~~reacting the organic composition in the presence of a liquid phase catalyst comprises reacting the organic composition in the presence of said liquid phase catalyst is selected from the group consisting of HCl, H₂SO₄, HNO₃, NaOH, and KOH.~~

20. (Currently amended) The process of claim 16, wherein ~~reacting the organic composition with the short chain alcohol or water in the presence of a catalyst comprises reacting the organic composition in the presence of said catalyst is a solid phase catalyst.~~

21. (Currently amended) The process of claim 20, wherein ~~reacting the organic composition in the presence of a solid phase catalyst comprises reacting the organic composition in the presence of said solid phase catalyst is a microporous crystalline solid.~~

22. (Currently amended) The process of claim 20, wherein ~~reacting the organic composition in the presence of a solid phase catalyst comprises reacting the organic composition in the presence of said solid phase catalyst is an exchange resin with either acidic or basic properties.~~

Serial No. 09/554,708

23. (Currently amended) The process of claim 20, wherein ~~reacting the organic composition in the presence of a solid phase catalyst comprises reacting the organic composition in the presence of said solid phase catalyst~~ is an inorganic oxide selected from the group consisting of alumina, silica, silica-alumina, boria, oxides of phosphorus, titanium dioxide, zirconium dioxide, chromia, zinc oxide, magnesia, ion exchange resins, silicate catalysts, and calcium oxide either unmodified or modified with chlorine, fluorine, sulfur or an acid or base.

Claim 24 (Canceled)

25. (Previously added) The process of claim 16, further comprising recycling said critical fluid medium for use in a later reaction.

Claim 26 (Canceled)

27. (Currently amended) The process of claim 16, wherein ~~providing a critical fluid medium comprises providing said critical fluid medium optionally includes including a critical fluid co-solvent~~ selected from the group consisting of methanol, ethanol, butanol, and water.

28. (Currently amended) A process for producing alkyl esters useful in biofuels and lubricants, said process comprising:

providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids;

providing a critical fluid medium including one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and mixtures thereof, and optionally including one or more critical fluid co-solvents selected from the group consisting of methanol, ethanol, butanol, and water;

dissolving the organic composition and either a C₁-C₄ short chain alcohol or water into the critical fluid medium;

Serial No. 09/554,708

reacting the organic composition with the short chain alcohol or water in the presence of a catalyst in a single phase to produce a final product comprising an alkyl ester and glycerol, wherein said glycerol leaves the single phase as it is formed;

separating said glycerol from said final product by modifying the temperature and pressure of the final product; and

separating said alkyl ester product from said critical fluid medium by modifying the temperature and pressure of the critical fluid medium.

29. (Previously added) (Previously Twice Amended) A process for producing alkyl esters useful in biofuels and lubricants, said process comprising:

providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids;

providing a critical fluid medium including one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, propane, and mixtures thereof;

dissolving the organic composition and either a C₁-C₄ short chain alcohol or water into the critical fluid medium; and

reacting the organic composition with the short chain alcohol or water in the presence of a catalyst at a temperature from about 20°C to about 200°C and a pressure from about 150 psig to about 4000 psig, wherein the reaction occurs in a single phase to produce a final product comprising an alkyl ester and glycerol and wherein said glycerol leaves the single phase as the glycerol is formed;

wherein the critical fluid medium is selected such that a reaction temperature is within about 20% of a critical temperature of the critical fluid medium and a reaction pressure is within about 0.5 to about 15 times a critical pressure of the critical fluid medium as modified by a co-solvent.

30. (Previously added) A process for producing alkyl esters useful in biofuels and lubricants, said process comprising:

Serial No. 09/554,708

providing an organic composition comprising one or more components selected from the group consisting of acylglycerols, fats, oils, waxes, and free fatty acids;

dissolving the organic composition and a C₁-C₄ short chain alcohol or water into a critical fluid medium, wherein the critical fluid medium is one or more fluids selected from the group consisting of carbon dioxide, sulfur dioxide, methane, ethane, and propane, and mixtures thereof, the critical fluid medium solubilizing the organic composition and the C₁-C₄ short chain alcohol or water into a single phase;

reacting the organic composition with the C₁-C₄ short chain alcohol or water in the presence of a catalyst in the single phase; and

producing a final product comprising an alkyl ester and glycerol, wherein the glycerol is separated from the alkyl ester by controlling the temperature and pressure of the reaction conditions.